Title: Maybe It Will, Maybe It Won't

Probability

Brief Overview:

Students will use their problem solving strategies to strengthen and increase their knowledge of probability to solve various activities. The activities begin with the student's ideas of chance and what are the chances of certain events occurring. The ideas of chance leads into what is most likely to occur and what is least likely to occur with the use of spinners. Finally this leads to the understanding of a whole, and parts of a whole, which introduces the skill of fractions.

NCTM Content Standard/National Science Education Standard:

Problem Solving
Data Analysis and Probability

Grade/Level:

2^{nd} -3rd

Duration/Length:

5 days at 50 minute lessons.

Student Outcomes:

Students will:

- Identify possible outcomes that make up the sample space such as on a number cube rolling a 2.
- Identify the relative probability of one simple event by using probability terms : more likely, less likely, equally likely.
- Apply knowledge of fractions by reading, writing and representing halves, or fourths as a part of a set using symbols, words o r models.

Materials and Resources:

- Spinners
- Grid Sheets
- Markers
- Journal Writing Prompts
- Manipulatives (color tiles, game boards, jellybeans, counters, bags, spinner, snap cubes, and socks)
- Resource Sheet1-Student: Choosing Chips
- Resource Sheet2-Student: It's Probably Jelly Beans!

- Resource Sheet3-Student: Probability Journal
- Resource Sheet4-Student: Fair Counters
- Resource Sheet5-Student: Grab a Bag
- Resource Sheet 6-Teacher: The teacher will discuss each spinner
- Resource Sheet7-Student: Snappy Cube Game
- Resource Sheet8-Student: Spinner Journal
- Resource Sheet9-Student: Finding Fair Shares
- Resource Sheet10-Student: How much is it?
- Resource Sheet11-Student: The "Likelihood" of Spinners
- Resource Sheet 12-Student: Journal Writing Activity
- Resource Sheet13-Student: Assessment

Development/Procedures:

Lesson 1

Preassessment – – Give each student (RS1- Student) with four types of snacks listed. Have all students share their choices and have students tally each choice. Tell student to complete the questions below once they have decided which snack they like the best. Ask students how they could best display this information. Introduce pictograph and explain how a pictograph can record information to show "most" and least".

Launch – Discuss the weather with students. What is the chance that it will snow on a hot summer day? What is the chance that it will be a hot 90 degree day in January? The students should conclude that both of these events are unlikely to occur. Reveal that it is most likely to snow in the winter months It is also most likely to have a hot 90 degree day in the summer months. It is least likely to snow and be hot in the month of June.

Teacher Facilitation – Present transparent coins to the class using the overhead projector, displaying that the coin has two different sides. Ask the students if the coin is tossed 20 times by the teacher and an additional 80 times by each group, how many times do they think the coin will land on heads and how many times will it land on tails. Toss the coin and keep track of how many heads and how many tails. Theoretically, the numbers should be equal, because the coin is fair, and it should land on heads and tails the same number of times. Ask the students why should the coin land on the head and tail side the same amount of times? The students should conclude that the coin is equally fair, because the sides are equal. However, that may not be the result of an experiment.

Student Application – To practice skills, students will play the "Jelly Bean" game. Distribute (RS2-Student), and

manipulatives such as socks, jellybeans. The students will work in pairs to complete this activity. Teacher will model the game for students and answer any questions prior to starting the game. Have pre-packed jelly beans in snack bags as follows: 4 red, 7 black, and 1 yellow. Explain to the students that they will use jellybeans to determine "most" or "least". Ideally students should color jellybeans on resource sheet before recording their information on data collection sheet. Each student will take one jellybean out at a time. After recording their information they will return the jellybean back to the sock and the next student will repeat the process and record their finding. Tell the students they will conduct a total of 24 trials to see how many colors they could pull out of the socks. Continue to identify probability with the terms most or least. Circulate and observe the students work by recording your findings on the teacher's observation log sheet. Allow the students to grow into knowledge of the concept on their own. Actively engage the students in problem solving.

Embedded Assessment – Distribute the journal writing activity. Resource Sheet 3 Student. Read through the journal with students and review the criteria.

Reteaching/Extension –

- Distribute the worksheet, "Fair Counter", RS 4, Student. Each student will receive a counter. One side is red the other is yellow. Have students flip the counter 20 times and record each flip in the correct column on the handout. Ask if the counter is a fair counter? Why is/is not it a fair counter? The students should be able to conclude that the counter is a fair counter because it provides an equal chance to land on each side.

Lesson 2

Preassessment - Have students work in three teams to complete the activity "Grab a Bag. Read and explain the game to the students. Give each team a bag labeled A, B, or C with ten color tiles in each bag. The students are to predict what set of color tiles are in each bag based on the results of a probability experiment. Students will choose a tile from the bag, record the data, and return the tile to the bag. Each team will determine their prediction by conducting a total of twenty trials. Remind the students that they should record their data information on the (RS 5-Student) form. Encourage the students that they should use as many vocabulary terms as possible when they complete their journal prompts located on the resource sheet. After all of

the tiles have been tallied, discuss with students which grab bags they may have. Circulate and observe the students work by recording your findings on the teacher observation log. Ask students which method of recording this data would by most helpful and why?

Launch – Discuss the terms: certain, impossible and possible. Show these statements and allow the students to respond with : certain, impossible, or possible.

- It will hail tomorrow.(possible)
- A marble will sink in a cup of water.(certain)
- It will snow on a hot summer day.(impossible)

Allow students to make up statements that are certain, impossible, and possible.

Teacher Facilitation – Display 3 spinners on the overhead as well as actual spinners (Resource Sheet 6 Teacher). Discuss each spinner.

Distribute red and yellow precut construction paper circles that are the same size. Cut both of the precut circle from the edge to the middle of the circle (the radius).Put the circles together so that they can turn. Use each spinner description as a clue for the students. The students should turn the precut colored construction circles to represent an example that represents the clue that the teacher has read. Once the students have the representation, they are to hold it up in the air.

Clue 1- This spinner is divided equally into 2 equal shares. The spaces are equal, therefore it is an equal chance that the spinner will land on red or yellow.

Clue 2- The spinner is not divided equally. Most of the space is devoted to the red (3/4) with a small slice (1/4) devoted to yellow. This spinner does not provide an equal chance; therefore it is less likely to spin yellow.

Clue 3- This spinner is also not equal. It is most likely to spin red, because that is all that is there.

Student Application Play the game “Snappy Cubes game (RS 7-Student). To complete this activity the students will play the game in groups of four. Distribute game boards, colored spinners, and snap cubes. The students will play the game for eight minutes. Students need to place twelve snap cubes (at least 1 red, 1 blue, 1 yellow and 1 green) onto the

grid. Students will color in the fractional spinner using the same colors located on the collection data sheet prior to the start of the game. As the students spin the spinner they will remove 1 snap cube of that color from the grid. Have students tally the number of snap cubes on the data collection sheet. The remaining numbers of snap cubes left on the grid will be used along with the colored spinner to determine the most or least colors used. Explain to them that the colored spinner can represent fractions. Tell the students that each of the colored spinner parts illustrate more by showing halves, least by showing one fourths and equally likely by showing two sizes that are the same. Access the student's knowledge of most likely, least likely and equally by observing their data information recorded on the spinners. Teacher will record the students reasoning and concept of probability during the game.

Embedded Assessment – Distribute the journal writing activity. (Resource Sheet 8 Student) Review directions and criteria with students.

Reteaching/Extension – Review the spinner and what each spinner represents.

Equally likely – There is an equal chance of the spinner landing on either side. The sides are equal in size, ½ is one color and ½ is the other color.

Less likely – There is a chance of the spinner landing on yellow, because there is ¼ that is yellow. But there is ¾ red which is a greater area.

More likely – All the space is red, so there is no other chance of landing on yellow, because there isn't any.

Call on three friends to come up and illustrate an equally likely, less likely, and a more likely diagram. Discuss and review their results.

Lesson 3 Preassessment/Launch – Ask the class who likes pizza? Inform the students that sharing fair portions with a friend or family member is important. The students will diagram how they would divide equally. Ask for two volunteers to come up and illustrate how they would equally share if it were only 2 of them. The blank circle should already be on display for them. The students should draw a line down the center to display halves. Students would diagram how to equally divide it into 4 pieces. Two other volunteers will be

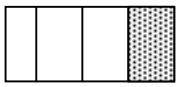
needed to illustrate how they would divide a pizza equally among 4 people. The teacher will then incorporate:

The whole pizza is equivalent to 1
Most likely

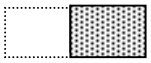
The whole pizza divided into two equal parts
½ + ½ = 1
equally likely
equal shares

The whole pizza divided into 4 equal parts
1/4+1/4+1/4+1/4=1
equal shares

Teacher Facilitation – Inform the students that today they will be doing something a little different. They will be working with fractions. Explain that fractions are a part of a whole. They are parts that are divided when the whole has been divided or sliced equally into fair shares. Things can be divided into many pieces equally but for today all we will be discussing is 1, a whole, ½, halves, or 2 fair shares and ¼, fourths, four fair shares. To make certain that they understand fair shares, a worksheet needs to be completed Distribute the" Finding Fair Shares Worksheet" RS 9-Student. Once the worksheet is completed, review the responses and make corrections as needed. There are 8 examples, 5 do not represent fair shares, students should have circled 3 responses. Review the concept that fractions are a part of a whole and are equally divided pieces. Introduce to the students that the number on the bottom (the denominator) will always tell how many pieces there are in all. Introduce that the top number (the numerator) will answer whatever is being asked, such as, which part is shaded, which part is not shaded. Provide a few examples to check for understanding and provide a few fractions on the board and select three friends to come up and illustrate the examples.



3 how many that are not shaded
4 how many pieces



1 how much is shaded
2 how many pieces

Student Application – Distribute the "How much is it?" RS 10 Student. Students will work with their elbow partner to complete the worksheet related to fractions. (The elbow partner is the person that sit to the left or the right of them, at their elbow.) Once the worksheet is completed, review the student responses. Encourage students to notice the different denominator. Apples and oranges represent different fractions on different diagrams. Instruct the students to turn that handout over and place it in the corner on their desk.

Distribute "The Likelihood of Spinners" work sheet RS 11-Student, which is very similar to the one that the students just completed. Tell the students ," Let's turn these same pictures into spinners."
For spinner A , what is the chance that someone will spin apples (equally likely), oranges (equally likely)?

For spinner B, what is the chance of spinning a peach, orange, banana, apple (all are equally likely)?

For spinner C, what is the chance of spinning strawberries? (Certain), Oranges, apples (impossible)

Once both of the worksheets have been completed and reviewed, instruct the students to turn over the first worksheet that was completed. Ask if anyone sees a relationship with the two worksheets. The students should reply with responses that are similar to:

- Spinner A is equal to a fraction of ½, which is equal to a chance of equally likely because the pieces are equal in size. ½+1/2=1
- Spinner B is equal to a fraction of ¼, which is equal to a chance of equally likely because the pieces are equal in size, ¼+1/4+1/4+1/4=1
- Spinner C represents 1 whole. It is certain to fall on strawberries because that is all that is there.

Embedded Assessment –Distribute the journal writing activity SR -12 Student. Review directions, criteria, and the hint with the students

Reteaching/Extension - Review the relationships that the spinners have to fractions.
Encourage the students to relate the idea of sharing equally.

Summative Assessment:

The students will complete Assessment Activity (SR13). They will apply prior knowledge of statistics and probability, measurement, and fractions to complete each section. They will use the data provided to determine most likely, least likely, and equally likely. The students will use vocabulary terms to complete journal writing prompts.

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Choosing Chips

Directions:
Record answers to the question below using tally marks.

Which Chip Do You Prefer?

Corn Chips _____

Potato Chips _____

Tortilla Chips _____

Pretzels _____

Use tally marks to record the choices of the students in your class.

1. How many students liked **corn chips**? _____

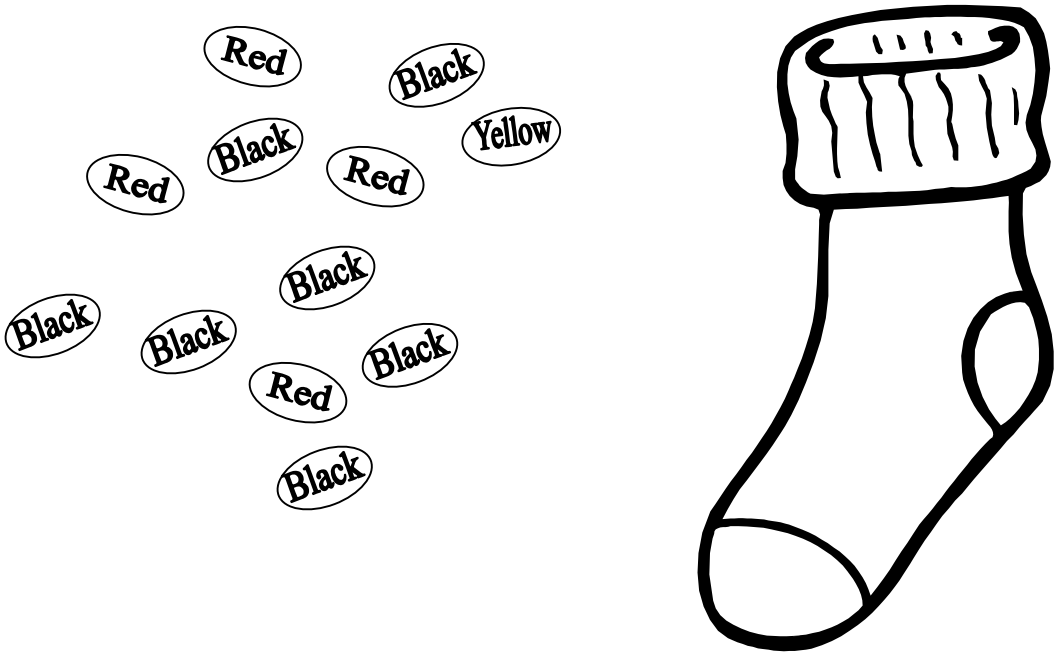
2. How many students liked **potato chips**? _____

3. Which snack was preferred the **most**? _____

4. Which snack was preferred the **least**? _____

It's Probably Jelly Beans!!

Directions: Look at the jellybeans. If you were to place all of the jellybeans in the sock and pull one out, what might your *possible outcomes* be? What color would you be *most likely* to get?



Fill in the table below to show the outcomes, frequency and probability of pulling each of the colors.

Outcome	**Tally**	**Frequency**	**Experimental Probability** (More, Less, Least)
Yellow			
Red			
Black			

Probability Journal

We picked 24 jelly beans out of the sock. The color of _____ appeared the most. I think this happened because_____
_____
_____
_____
_____
_____
_____
_____

Criteria for an Excellent Journal Response

- ☐ Uses probability vocabulary
- ☐ Demonstrates understanding of most likely
- ☐ Demonstrates understanding of least likely
- ☐ Demonstrates understanding of unlikely
- ☐ Explains ideas with specific details

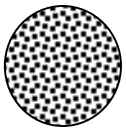
Fair Counters

Toss the two-color counters ____ times and _____

_____

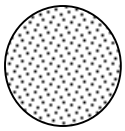
_____

_____



Red

Yellow



The two-color counters are **fair** / **unfair** because _____

_____

_____

_____

_____

_____

Grab a Bag

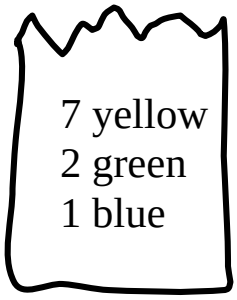
Directions: Work with a partner to complete the following activity.

- There are a total of *10 color tiles* in each bag.
- There are yellow, green, and blue tiles in each bag.
- Conduct an experiment *20 times*.

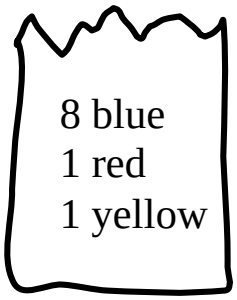
Below is a data collection chart. Tally the tiles pulled from the bag during your investigation.

Colored Tiles	Tallies	**Total**
Yellow		
Green		
Blue		
Red		

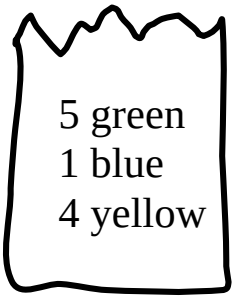
BAG A



BAG B



BAG C



Predict which tile bag you have. Explain your answer using data from your investigation, math vocabulary, and numbers.

I think we have Bag ____ with ____ yellow tiles, ____ green tiles, ____ blue tiles, and ____ red tiles. I think this because _____

_____

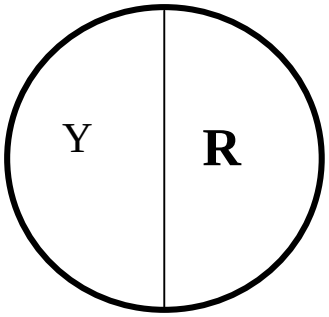
_____

_____

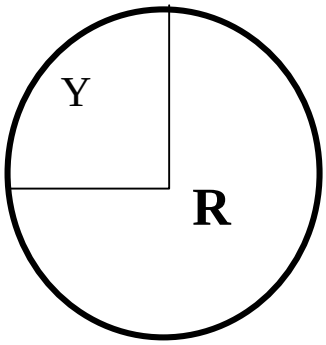
_____

_____

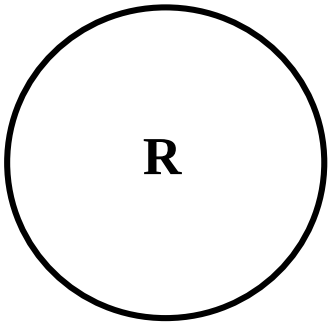
The teacher will discuss each spinner:



This spinner is divided equally into 2 equal shares. The spaces are equal, therefore it is an equal chance that the spinner will land on red or yellow.



This spinner is not divided equally. Most of the space (3/4) is red with a small amount (1/4) yellow. This spinner does not provide an equal chance, therefore it is less likely to spin yellow.

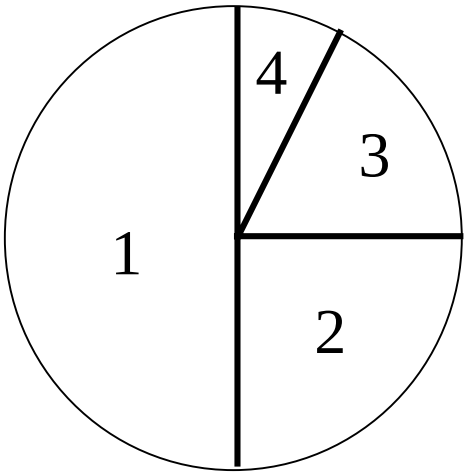


This spinner is also not equal. It is most likely to spin red, because that is the color the fills the area of the circle.

Snappy Cube Game

Directions: Work in pairs to complete the following activity.

- There are a total of twelve cubes.
- Color the spinner using red, blue, yellow, and green
- Use your spinner to flip to a color.
- When the spinner stops on a color, place that color cube on the game board.
- Play until time is up, then compare your results to the spinner !!



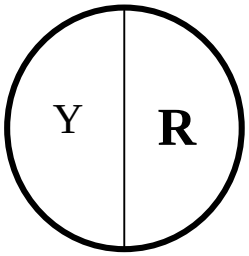
R	B	Y	G

Directions: Using the data chart below, record your information.

Snap Cubes	Tallies	Total
Red		
Blue		
Yellow		
Green		

Spinner Journal

Choose a spinner from the ones shown below and then describe the likelihood of the spinner to land on either red or yellow.



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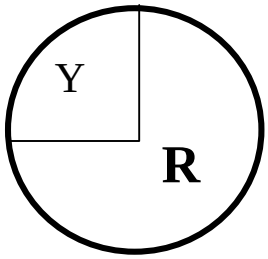

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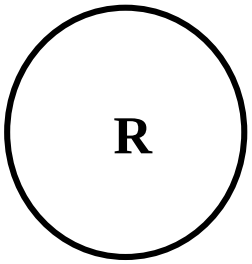

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Today I explored **probability** during Math. If I want to land on the color **_____,** that color on the spinner I chose would be:

O Equally likely
O Less likely
O More likely

to land on because

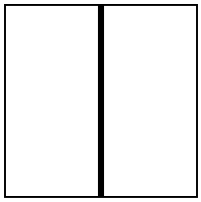
_____
_____
_____
_____
_____
_____
_____
_____

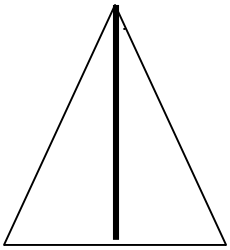
Criteria for an Excellent Journal Response

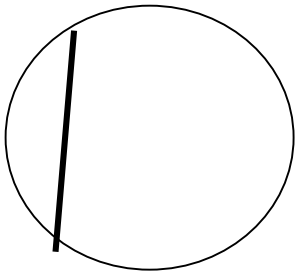
- ☐ Uses probability vocabulary
- ☐ Demonstrates understanding of likelihood
- ☐ Explains ideas with specific details

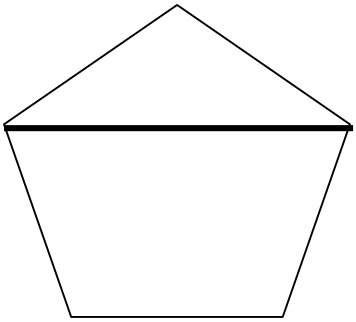
Finding Fair Shares

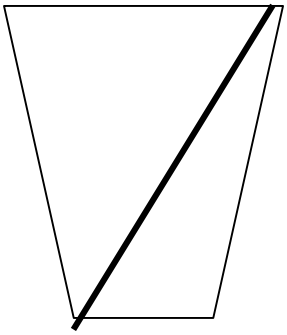
Circle the shapes that are divided equally and fairly.

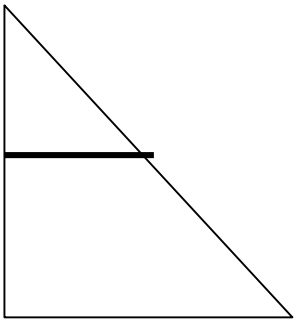


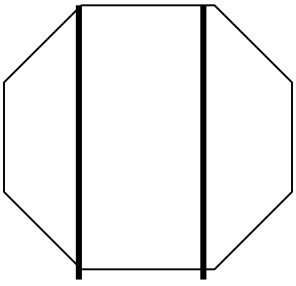


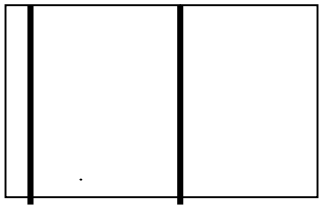




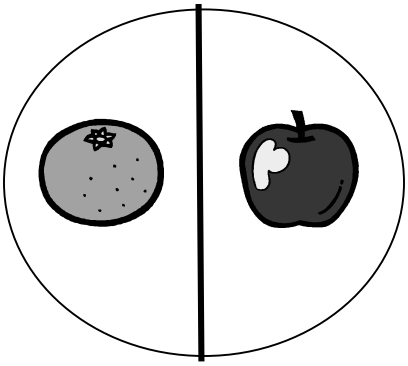






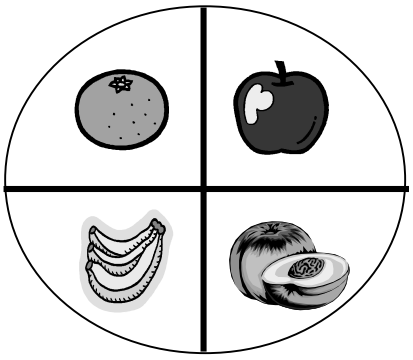


How much is it?



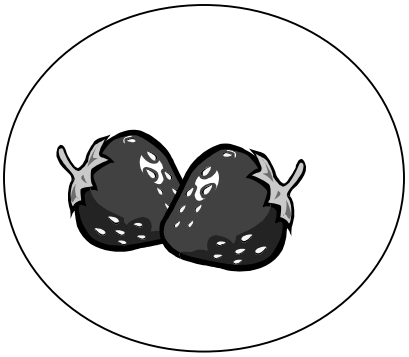
What fraction of the circle has apples?

_____



What fraction of the circle has the bananas?

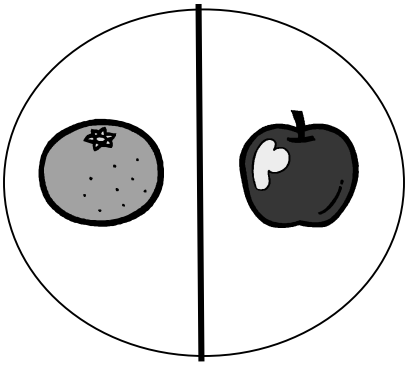
_____



What fraction of the circle has strawberries?

_____

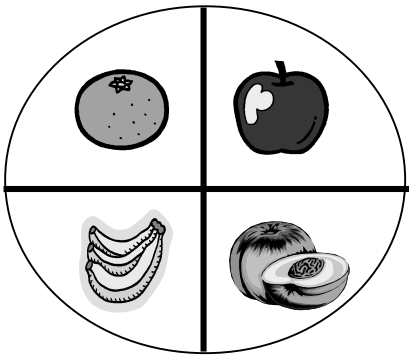
The “Likelihood” of **Spinners**



What is the chance that someone will spin apples?

O Equally likely

O Most likely



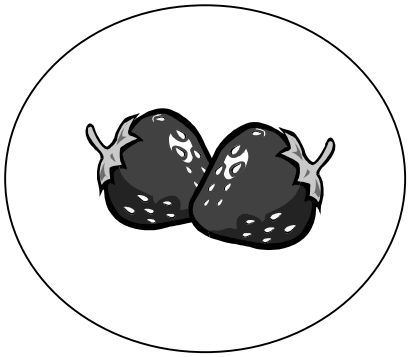
What is the chance of spinning:

Peaches: O equally likely
O most likely

Oranges: O equally likely
O most likely

Bananas: O equally likely
O most likely

Apples: O equally likely
O most likely



What is the chance of spinning:

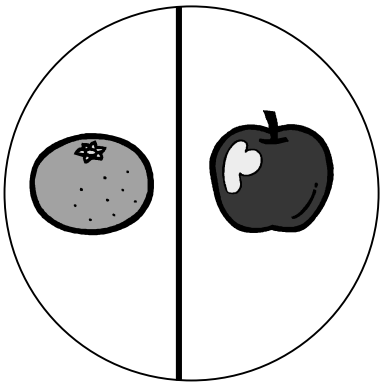
Strawberries: O equally likely
O most likely

Apples O most likely
O least likley

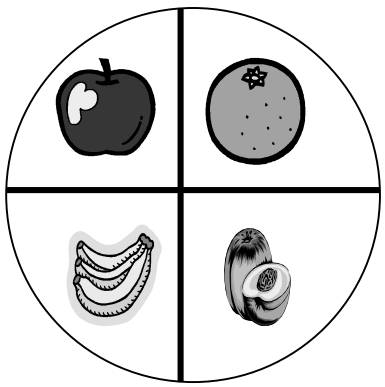
Journal Writing Activity

Select a spinner.

A



B



Select a spinner O O

Write a fraction for the area that has apples._____

***Hint The bottom number tells how many pieces in all and the top number answers the question that is asked.**

Explain what is the chance of the spinner landing on apples and provide evidence for how you know.

_____
_____
_____
_____

Criteria

- Probability vocabulary used
- Writes fraction correctly
- Explains with specific details

Assessment

Part I.
Directions: Answer each question using the pictograph below. Tell whether the items show most, least, or equal.

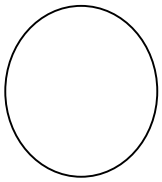
"Fruity Fruits"

Bob					
Tom					
Sue					
Billy					

1. Which student liked the least fruit?_____
2. Which two students liked equal amounts of fruit? _____
3. Which student liked fruit the most? _____

Part II
Directions: Use the pictograph to color in the correct fraction below for each fruit.

1. Color ¼ of the circle.



2. Color ½ of the rectangle.

Assessment

3. Billy will show one whole by drawing a picture:

Part III.
Directions: Using the vocabulary words least, most, and equal, to complete the paragraph.

I think Bob had the _____ amount of grapes and Billy had the _____ amount of fruit because_____.
I also think the students who had _____amounts were _____ because _____.